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RESEARCH NOTE LS-38

LAKES STATES FOREST EXPERIMENT STATION • U. S. DEPARTMENT OF AGRICULTURE

Early Pruning Reduces Blister Rust Mortality In White Pine Plantations

Early pruning of lower branches in a young white pine plantation in north-central Wisconsin has reduced fatal blister rust infection from 59 to 19 percent. This Wisconsin location is in Zone 4 (Van Arsdel, 1961b) which is favorable to blister rust spread.

White pine has been extensively planted in the southern two-thirds of Wisconsin during the past 30 years, and there are many additional sites where it would be the best species to use. Most of it is planted in small blocks on private land where intensive management can be very profitable.

White pine should be grown in the shade of other species, except in the extreme southern part of the region. Unfortunately, however, most of it has been planted on open land where blister rust, tip weevil damage, and abnormal growth are often serious problems. Blister rust control by ribes eradication is often too costly or impractical on such small areas, and chemical control of the tip weevil has not been fully worked out.

In the Lake States, a high percentage of lethal blister rust infections enters the stems of young white pines through needles on the lower branches where the microclimate is most favorable (Van Arsdel, 1961a). As these lower branches gradually die from natural shading, particularly in a well-stocked stand, many branch cankers also die before the fungus can reach the stem. The reduced needle surface low in the crown also lessens the potential for new infection. In many instances, however, lethal infections reach the stems of small trees before the lower branches die. Therefore, early removal of live branches (fig. 1) is a recommended blister rust control practice (King, 1958).¹ Research results have also indicated that some form of annual or biennial pruning, started when

the trees are young, can be more profitable than conventional pruning methods (Ralston and Lemmien, 1956).

In 1957 a long-range study was initiated to see if pruning could be used both to reduce the number of fatal blister rust cankers in the stand and to provide additional well-formed crop trees with surface-clear butt logs. The earliest pruning test is located in a Lincoln County forest plantation established in 1954 in SESW Sec. 26, T. 33 N., R. 7 E. The plot consists



FIGURE 1.—The first pruning was performed 3 years after planting.

¹ The practice would not be of much value, however, in most of the northern part of Zone 4 (Lake Superior coastal region) where numerous infections often occur high in the crowns.

of six rows of trees, with pruned and unpruned rows alternating. Pruning was done and blister rust infection data were recorded in the spring of 1957 and in the falls of 1958, 1960, and 1962. Hand clippers were used to remove one or two whorls at each pruning. At least one-half the live crown was left in each tree. Blister rust infection data as of 1962 are as follows:

	<i>Pruned</i>	<i>Unpruned</i>
Healthy trees	178	105
Fatally infected ¹	43	152
Total trees	221	257
Percent fatally infected	19	59

¹ *With a fatal stem canker or a branch canker that would probably be lethal if not pruned.*

Tree height averaged 1 foot in 1957 and 9 feet by 1962. No appreciable loss of height growth has been noted in pruned trees as compared to the unpruned checks. Thus far, a total of 5 man-hours has been spent on the four biennial prunings — less than 2 minutes per tree.

Now that the lower half of the crown has been removed to an average height of 4 feet (fig. 2), it is unlikely that any appreciable amount of fatal infection will occur. Therefore, additional pruning at 2- or 3-year intervals may actually be of more value to correct growth malformation and to hold the core of knotty wood in the stem to a minimum size.

Research results show that early and frequent pruning of young white pines greatly reduces the amount of fatal blister rust infection. It is a practical disease control measure that owners of small plantations and ornamental trees can use to advantage.

Further pruning at 2- or 3-year intervals will evaluate the additional reduction of fatal blister rust infection and the cost of early pruning compared to conventional methods.



FIGURE 2.—The fourth pruning took place 8 years after planting.

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